

Application No. 10/612,733
37 C.F.R. § 1.312 amendment

page 3 of 13
January 13, 2006

Listing of Claims:

1. (Original) A re-writable memory comprising:

a semiconductor substrate;

a cross point memory array formed above the semiconductor substrate, including

at least one x-direction conductive layer that includes conductive array lines;

at least one y-direction conductive layer that includes conductive array lines; and

memory plugs;

at least one x-direction driver set that drives the at least one x-direction conductive layer,
the at least one x-direction driver set being formed on the semiconductor substrate; and

at least one y-direction driver set that drives the at least one y-direction conductive layer,
the at least one y-direction driver set being formed on the semiconductor substrate;

wherein the at least one x-direction driver set and the at least one y-direction driver set
both use logic to drive isolated conductive array lines, and wherein at least one driver set is
substantially underneath the cross point memory array.

2. (Original) The re-writable memory of claim 1, wherein:

a first portion of at least one driver set is positioned on a first side of the cross point array,
and a second portion of the at least one driver set is positioned on the opposite side of the cross
point array.

3. (Original) The re-writable memory of claim 2, wherein:

the first and second portions of the at least one driver set are interdigitated.

Application No. 10/612,733
37 C.F.R. § 1.312 amendment

page 4 of 13
January 13, 2006

4. (Original) The re-writable memory of claim 3, wherein:

the at least one driver set substantially underneath the cross point array is the at least one x-direction driver set.

5. (Original) The re-writable memory of claim 4, wherein

the at least one y-direction driver set is not underneath the cross point memory array.

6. (Original) The re-writable memory of claim 4, wherein:

a portion of the at least one y-direction driver set is underneath the cross point memory array.

7. (Original) The re-writable memory of claim 3, wherein:

the at least one driver set substantially underneath the cross point array is the at least one y-direction driver set.

8. (Original) The re-writable memory of claim 7, wherein

the at least one x-direction driver set is not underneath the cross point memory array.

9. (Original) The re-writable memory of claim 2, wherein:

a portion of the at least one x-direction driver set is underneath the cross point memory array.

Application No. 10/612,733
37 C.F.R. § 1.312 amendment

page 5 of 13
January 13, 2006

10. (Original) The re-writable memory of claim 2, wherein:

the first and second portions of the at least one driver set are not interdigitated.

11. (Original) The re-writable memory of claim 10, wherein:

all the driver sets are substantially underneath the cross point memory array.

12. (Original) The re-writable memory of claim 11, wherein:

there are at least four driver sets that drive three x-direction conductive layers and two y-direction conductive layers.

13. (Original) The re-writable memory of claim 12, wherein:

there are at least six driver sets that drive five x-direction conductive layers and four y-direction conductive layers.

14. (Original) The re-writable memory of claim 11, further comprising:

other peripheral circuitry that is formed in the semiconductor substrate and is substantially underneath the cross point memory array.

15. (Original) A re-writable memory comprising:

a semiconductor substrate;

Application No. 10/612,733
37 C.F.R. § 1.312 amendment

page 6 of 13
January 13, 2006

a cross point array that is formed on top of the semiconductor substrate and electrically connected to the semiconductor substrate, the cross point array including a layer of x-direction conductive array lines, a layer of memory plugs, and a layer of y-direction conductive array lines;

an x-direction driver set formed on the semiconductor substrate, each driver within the set being electrically coupled to a single x-direction conductive array line on the layer of x-direction conductive array lines; and

a y-direction driver set formed on the semiconductor substrate, each driver within the set being operably connected to a single y-direction conductive array line on the layer of y-direction conductive array lines and being operable to drive a memory plug to a read voltage or a write voltage in conjunction with the x-direction driver set;

wherein at least one of the driver sets is substantially underneath the cross point memory array.

16. (Original) The re-writable memory of claim 15, wherein:

a first portion of at least one driver set is positioned on a first side of the cross point array, and a second portion of the at least one driver set is positioned on the opposite side of the cross point array.

17. (Original) The re-writable memory of claim 16, wherein:

the first and second portions of the at least one driver set are interdigitated.

18. (Original) The re-writable memory of claim 16, wherein:

Application No. 10/612,733
37 C.F.R. § 1.312 amendment

page 7 of 13
January 13, 2006

the first and second portions of the at least one driver set are not interdigitated.

19. (Original) The re-writable memory of claim 15, wherein:

all the driver sets are substantially underneath the cross point memory array.

20. (Original) The re-writable memory of claim 19, wherein:

the cross point array has multiple layers of memory plugs.

21. (Original) A re-writable memory comprising:

a semiconductor substrate;

a cross point memory array formed above the semiconductor substrate, including

at least one x-direction conductive layer that includes conductive array lines;

at least one y-direction conductive layer that includes conductive array lines; and

memory plugs;

at least one x-direction driver set that drives the at least one x-direction conductive layer,
the at least one x-direction driver set being formed on the semiconductor substrate; and

at least one y-direction driver set that drives the at least one y-direction conductive layer,
the at least one y-direction driver set being formed on the semiconductor substrate;

wherein at least one x-direction driver set is entirely driving conductive array lines from
one side of the conductive array.

22. (Original) The re-writable memory of claim 21, wherein:

Application No. 10/612,733
37 C.F.R. § 1.312 amendment

page 8 of 13
January 13, 2006

the at least one x-direction driver set and the at least one y-direction driver set both use logic to drive isolated conductive array lines.

23. (Original) The re-writable memory of claim 21, wherein:

the at least one x-direction driver set is substantially underneath the cross point memory array.

24. (Original) The re-writable memory of claim 23, wherein:

all x-direction driver sets are substantially underneath the cross point memory array.

25. (Original) The re-writable memory of claim 21, wherein:

the memory plugs exhibit a non-linear resistive characteristic.

26. (Original) The re-writable memory of claim 25, wherein:

the memory plug includes a conductive metal oxide.

27. (Original) A re-writable memory comprising:

a semiconductor substrate;

a cross point memory array formed above the semiconductor substrate, including

at least one x-direction conductive layer that includes a portion of contiguous x-direction conductive array lines;

Application No. 10/612,733
37 C.F.R. § 1.312 amendment

page 9 of 13
January 13, 2006

at least one y-direction conductive layer that includes a portion of contiguous y-direction conductive array lines; and

memory plugs;

at least one x-direction driver set that drives the at least one x-direction conductive layer, the at least one x-direction driver set including a non-interdigitated driver subset that

drives the portion of contiguous x-direction conductive array lines; and

is formed on the semiconductor substrate such that it makes electrical contact with the portion of contiguous x-direction conductive array lines from a first side of the cross point array; and

at least one y-direction driver set that drives the at least one y-direction conductive layer, the at least one y-direction driver set being formed on the semiconductor substrate.

28. (Original) The re-writable memory of claim 27, wherein:

the non-interdigitated driver subset is placed underneath the cross point memory array.

29. (Original) The re-writable memory of claim 27, wherein:

the at least one x-direction conductive layer includes a second portion of contiguous x-direction conductive array lines; and

the at least one x-direction driver set includes a second non-interdigitated driver subset that

drives the second portion of contiguous x-direction conductive array lines; and

is formed on the semiconductor substrate such that it makes electrical contact with the second portion of contiguous x-direction conductive array lines from a second side of the cross point array, the second side being opposite from the first side.

Application No. 10/612,733
37 C.F.R. § 1.312 amendment

page 10 of 13
January 13, 2006

30. (Original) The re-writable memory of claim 29, wherein:

the at least one y-direction driver set includes a second non-interdigitated driver subset that

drives the portion of contiguous y-direction conductive array lines; and

is formed on the semiconductor substrate such that it makes electrical contact with the portion of contiguous y-direction conductive array lines from a third side of the cross point array, the third side being adjacent to the first side.

31. (Original) The re-writable memory of claim 30, wherein:

the at least one y-direction conductive layer includes a second portion of contiguous y-direction conductive array lines; and

the at least one y-direction driver set includes a second non-interdigitated driver subset that

drives the second portion of contiguous y-direction conductive array lines; and

is formed on the semiconductor substrate such that it makes electrical contact with the second portion of contiguous y-direction conductive array lines from a fourth side of the cross point array, the fourth side being opposite from the third side.

32. (Original) The re-writable memory of claim 31, wherein:

the x-driver subsets and the y-driver subsets are placed underneath the cross point memory array.

Application No. 10/612,733
37 C.F.R. § 1.312 amendment

page 11 of 13
January 13, 2006

33. (Original) The re-writable memory of claim 27, wherein:

the cross point memory array formed above the semiconductor substrate is one of a plurality of cross point memory arrays formed above the semiconductor substrate.

34. (Original) The re-writable memory of claim 33, wherein:

the memory is organized to read or write N bits of data at a time, and

the number of cross point memory arrays in the plurality of cross point memory arrays is N or a multiple of N .

35. (Original) The re-writable memory of claim 27, wherein:

the re-writable memory is a portable storage device.

36. (Original) The re-writable memory of claim 35, wherein:

the memory plugs exhibit a non-linear resistive characteristic.

37. (Original) The re-writable memory of claim 36, wherein:

the memory plug includes a conductive metal oxide.